APRIL 1968
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Fifty Cents

Precision SHOOTING

In This Issue:

INTERNATIONAL MATCH NEWS
RESEARCH ON MORGAN JAMES
NBRSA MATCH SCHEDULES

a magazine
by shooters
for shooters

BENCH REST
Shooting Primer

Should one be inquisitive about the sport of Bench Rest Shooting, but doesn't know how to start, he should read these instructions: 1. Obtain an Official Rule Book from NBRSA Headquarters, Mrs. Bernice E. McMullen, 607 West Line St., Minerva, Ohio 44657. 2. At the same time, send her $8.00 for one year's membership. Anyone will save money by doing this, if he attends more than three registered matches a year. 3. From this Rule Book, a shooter will be able to choose the class of Bench Rest Shooting he prefers. 4. Pages two, three and eighteen describe the rifles and their limitations.

The act of Bench Rest Shooting consists of sitting at a bench with a rifle resting on sand bags. The object of this position is to eliminate, as much as possible, the errors encountered in the process of holding and firing a rifle. Bench Rest Shooting is a **sport**, competitive or individual. The personal satisfaction gained in the ability to place one bullet on top of another, thus making a one hole group at 100 Yards and often at 200 Yards, has captivated an enthusiastic interest of many shooters for this kind of sport. It is particularly suited to both men and women who are not interested in indulging in the more vigorous or active sports. Therefore many Bench Rest Shooters are of the older set. This does not mean, however, that it does not present a challenge to the younger shooter; it will engage and tax his capabilities as well.

The current popularity of this kind of shooting was generated by the organization of The National Bench Rest Shooters Association in the years 1949 and 1950. At that time a competitive program was introduced and has since been expanded.

Once an individual has selected the most appealing Bench Rest Class, **it is very important that he attends some of the Matches.** Here he will learn much by asking questions, observing the equipment and methods used for loading and shooting. Any Bench Rest Shooter is more than anxious to help a newcomer.

The equipment needed to participate is available, for the most part, from PRECISION SHOOTING advertisers. It includes rifles, telescopes, rests, sand bags, loading tools, bullets, cleaning materials, powder, primers, etc.

Lastly, if possible, get the advice of a person in the game before making purchases.

Should an individual or a club wish further information, write to Dr. A. H. Garcelon, President of the NBRSA, 133 State St., Augusta, Maine 04430; or M. H. Walker, R.D. #1, Mohawk, N. Y. 13407; or the Editor of PRECISION SHOOTING.

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PRECISION SHOOTING

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NOTICE TO ADVERTISERS

PRECISION SHOOTING is printed by letterpress. Display cuts are to be furnished by the advertiser. Advertising engravings will be made at standard rates if good black and white glossy prints are provided. Displays will be made to Advertiser's specifications. All normal composition will be set according to our own standards. Rate cards will be mailed to Advertisers on request.

NBRSA OFFICE MEMO

Available from the Secretary's office are the following: 100 and 200 yard targets in cartons of 500 only, $11.25. (10% discount for affiliated clubs, plus postage on 20 lbs. to proper zone) and on hunter targets, $16.25 per carton of 500 (plus postage on 28 lbs. to proper zone). Coat brassards, $1.25 each; and rule books, $.50 each.

We are out of rule books until a new printing is made; all those who have sent money in will get their books as soon as they are out.

NBRSA membership for one year is $8.00. This includes a subscription to PRECISION SHOOTING for the membership term. NBRSA associate membership, no magazine, $2.50 a year. NBRSA Life Membership, $75.00. Club affiliation fee, $10 annually. Contact Bernice McMullen, Sec.-Treas., NBRSA, 607 West Line Street, Minerva, Ohio 44657.

From the President
RULE BOOK CORRECTION

Top of page 3 in 1968 Rule Book under rule B-2 the section reading "but for taper the front of the receiver ring shall be the measurement base" should be omitted. It does not apply under new rules for Varmint and Sporter Rifles, and is not applicable to bench rest rifles.

Hastily,
Doc

We sincerely apologize for not giving credit where credit is due. The marvelous cover photo in last month's issue of PRECISION SHOOTING was by John Collins.

NBRSA

1968 Match Schedule

NBRSA OFFICERS AND DIRECTORS FOR 1968

Dr. A. H. Garcelon (President)
133 State Street
Augusta, Maine 04330
MAyfair 2-1711

EASTERN REGION
M. H. (Mike) Walker (Director)
R. D. #1, Warren Road
Mohawk, New York 13407
Area Code 315, 866-5798

Wm. Kappel (Deputy)
212 Wayne Ave.
Haddonfield, N. J. 08033
Area Code 609, 429-4920

George E. Kelbly (Deputy)
4 N. Hickin Ave.
Rittman, Ohio 44270
Area Code 216, 925-1501

GULF COAST REGION
J. L. Bonner
P.O. Box 606
Cross Plains, Texas 76443
Area Code 817, 725-4146

MID-CONTINENT REGION
David B. Whittington
462 West Grand Avenue
Hot Springs, Arkansas 71901
Phones:
Area Code 501, 623-1812
or
Area Code 501, 623-5908

MISSISSIPPI VALLEY REGION
Arthur J. Freund
1038 Hornsby Avenue
St. Louis, Missouri 63147
Area Code 314, 388-2718

NORTH CENTRAL REGION
Walt C. Siewert
Box 749
Custer, South Dakota 57730

NORTHWEST REGION
Raymond G. Speer
925-7th Street
Lewiston, Idaho 83501
Area Code 208, 743-6135

SOUTHWEST REGION
Allen K. Hobbs (Direcotr)
7163 B Street
El Cerrito, Calif. 94532
Area Code 415, 525-5568

Don McLennon (Vice-Director)
1023 Tilson Dr.
Concord, Calif. 94520

Secretary-Treasurer
Bernice E. McMullen
607 West Line Street
Minerva, Ohio 44657
Area Code 216, 868-6132

EASTERN REGION

AUGUSTA, OHIO — Apr. 20, 21 Open and H.V.; May 11, 12 Open and H.V.; July 20 (night) Open and H.V.; **Aug. 27-30 Open National Championship;** Sept. 21 (night) Open and H.V. Reeds Run Rifle Range, Marie Brown, Box 66, Augusta, Ohio 44607.

EASTON, OHIO — Oct. 5, 6 300 Meter Open and H.V. Chippewa Rifle Club, Nelson Berger, Marshallville, Ohio 44645.

FASSETT, PENNA. — June 22, 23 All Varmint; July 13, 14 All Varmint; **Aug. 16, 17, 18 All Varmint—Eastern Region Championship.** South Creek Rod & Gun Club, Gerald Arnold, 107 South Kenyon St., Elmira, N. Y. 14904.

GREENVILLE, MICHIGAN — June 8 Open and H.V.; **July 6, 7 Open Eastern Region Championships;** Sept. 7, 8 Open and H.V. Flat River Conservation Club, Roger L. Powers, 509 Van Deinse Ave., Greenville Mich. 48838.

JOHNSTOWN, N. Y. — June 15, 16 Open and H.V.; **Sept. 14, 15 All Varmint, N. Y. State Championship.** Sec'y Pine Tree Rifle Club, Johnstown, N. Y. 12095.

WAPWALLOPEN, PENNA. — June 1, 2 Open and H.V.; Sept. 28, 29 Open and H.V. Council Cup Rifle Range, Robert W. Hart, 332 Montgomery St., Nescopeck, Pa. 18635.

GULF COAST REGION

GRAND PRAIRIE, TEX. — May 11 Bench Rest, Combined G.C. Region & TBRSA Championship; May 12 Light Varmint Region Championship; July 5 Light Varmint Speer Matches; July 6 Heavy Varmint Speer Matches; July 7 Bench Rest Speer Matches; **Oct. 12 Sporter, G.C. Region Championship; Oct. 13 Heavy Varmint, Combined G.C. Region and Grand Prairie Championship.** Ed Shilen, 4510 Harrington Road, Irving, Texas 75060.

MIDLAND, TEX. — June 15 L.V., TBRSA Championship; June 16 H.V., TBRSA Championship; August 17 Sporter, TBRSA Championship; Aug. 18 Hunter, TBRSA Championship (TBRSA Rules).

DON'T FORGET
MONTHLY CLUB SHOOTS

LTV ELECTROSYSTEMS GUN CLUB — Contact Jim Ridings, 606 Turtle Creek, Greenville Tex. 75401.

GRAND PRAIRIE GUN CLUB — Contact Ed Shilen, 4510 Harrington Road, Irving, Tex. 75060.

PERMIAN BASIN RIFLE AND PISTOL CLUB—Contact Tom Abernathy, P.O. Box 459, Midland, Tex. 79701.

ROCKDALE GUN CLUB—Contact Dalton R. F. Harbers, P.O. Box 267, Lexington, Tex. 78947.

CANYON GUN CLUB — Contact Gene Bowlin, 404 29th St., Snyder, Tex. 79549.

MID-CONTINENT REGION

KANSAS CITY, KANSAS — June 8 Open and H.V.; **Oct. 5 Open and H.V. Mid-Continent Region Championship.**

TULSA, OKLAHOMA — May 19 All Classes; June 22 (night) All Classes; July 14 All Classes; **July 30 - Aug. 2 National Varmint Championship.**

WICHITA, KANSAS — Apr. 27 All Classes (3 P.M.); **Aug. 17 All Classes, Kansas State Championship;** Oct. 26 All Classes (3 P.M.).

For further information contact David B. Whittington, 462 W. Grand Ave., Hot Springs, Arkansas 71901. Phone 501-NA3-1812 or 501-NA3-5908.

MISSISSIPPI VALLEY REGION

ST. LOUIS, MISSOURI — Apr. 20, 21 Open and L.V. and Sporter; May 18, 19 All Varmint; June 8, 9 Open and All Varmint; Aug. 10, 11 Open and L.V.; Sept. 15 H.V. Bench Rifle Club of St. Louis, Arthur J. Freund, 1038 Hornsby Ave., St. Louis, Mo. 63147. Phone 314-EV8-2718.

NORTH CENTRAL REGION

IOWA FALLS, IOWA — May 25 H.V. (night); May 26 Sporter (9 A.M.); June 22 Sporter (night); June 23 H.V. (9 A.M.); July 20 H.V. (night); July 21 Sporter (9 A.M.); Aug. 17 Sporter (night); Aug. 18 H.V. (9 A.M.); Sept. 21 H.V. (Night); Sept. 22 Sporter (9 A.M.). Lee R. Boddy, Iowa Falls Gun Club, Iowa Falls, Iowa 50126. Phone 515-648-2865.

NOTE

Clubs are urged to report match results promptly to NBRSA secretary's office as well as to PRECISION SHOOTING.

Puget Sound Bench Rifle Club

Seattle, Washington, April 6th, 1968

13½ lb. Varmint Rifle 100 yards

John Fry	457	365	261	428	397	3816 agg.
Ed Frombach	524	**357**	359	350	377	3934
Orv Johns	364	434	296	635	500	4458
Cliff Erb	886	450	**210**	438	**331**	4630
Manley Oakley	713	450	449	**322**	498	4864
Tom Seitz	**363**	416	654	682	352	4934
Mel Piper	497	523	701	548	591	5720
Foster	624	364	510	481	900	5758
L. E. Wilson	572	637	602	790	366	5934
Don Summers	563	461	660	949	428	6122
Stan Huser	553	833	1.049	1.158	615	8416
Roy Norman	674	581	776	1.305	1.342	9356
John Sparrow	254	2.447	973	2.012	1.262	1.5893

13½ lb. Varmint Rifle 200 yards

John Fry	845	651	**440**	756	**417**	3109*
Cliff Erb	**723**	810	671	879	848	3931
M. Oakley	1.007	853	1.482	**440**	747	4529
Ed Frombach	1.106	673	1.069	840	1.118	4806
Tom Seitz	1.042	903	996	1.026	900	4867
Foster	1.114	**434**	1,643	1.026	1.422	5639
Orv Johns	1.680	1.497	867	971	629	5644
Don Summers	931	731	1.706	1.222	1.568	6158
Mel Piper	1.392	1.700	1.511	941	702	6246
L. E. Wilson	1.439	2.195	1.153	997	1.233	7017
Stan Huser	1.604	2.305	1.597	1.627	2.269	9402

*** New Range Record**

Grand Agg. 13½ lb. Varmint Rifles

John Fry	3462
Cliff Erb	4280
Ed Frombach	4370
M. Oakley	4696
Tom Seitz	4900
Orv Johns	5051
Foster	5698
Mel Piper	5983
D. Summers	6140
L. E. Wilson	6475
Stan Huser	8909

10½ lb. Varmint Rifles 100 yards

Ed Frombach	548	**355**	404	331	372	4020
Tom Seitz	494	445	582	334	447	4604
Cliff Erb	498	515	**252**	448	738	4902
John Fry	420	527	475	475	571	4936
Stan Huser	**376**	678	493	531	398	4952
Mel Piper	448	557	636	668	**259**	5136
Allen Bench	410	829	440	486	635	5600
L. E. Wilson	1.128	556	498	**298**	489	5938
Foster	851	392	712	748	294	5994
Jerry Bean	791	667	425	533	944	6720
Orv Johns	452	898	769	769	608	6992
John Sparrow	1.058	1.005	742	845	1.169	9638
Kazuo Yutani	887	967	676	2.034	1.020	1.1168

10½ lb. Varmint Rifles 200 yards

Ed Frombach	**740**	1.050	738	1.149	1.195	4872
Tom Seitz	1.656	**638**	**603**	**500***	1.649	5046
L. E. Wilson	1.004	1.358	1.030	599	1.302	5293
Allen Bench	971	922	1.004	1.211	1.279	5387
John Fry	918	1.604	1.455	894	1.280	6151
Stan Huser	875	1.541	1.367	1.463	1.390	6636
Foster	884	1.217	1.480	2.756	**771**	7108
Cliff Erb	2.018	1.257	979	1.883	1.501	7638
Mel Piper	1.779	1.578	1.055	1.594	1.703	7709
John Sparrow	2.175	2.040	974	1.275	2.026	8490
Orv Johns	1.100	2.473	1.224	2.453	1.443	8692

*** New Range Record**

Grand Agg. 10½ lb. Varmint Rifles

Ed Frombach	4446
Tom Seitz	4825
Allen Bench	5493
John Fry	5543
L. E. Wilson	5615
Stan Huser	5794
Cliff Erb	6270
Mel Piper	6422
Foster	6551
Orv Johns	7842
John Sparrow	9064

The 1968 shooting was off to a good start with a new shooter, John Fry, making a clean sweep of the Heavy Varmint aggregates. He also set a new Northwest range record on the 200 yard stage with an agg. of 3109 MOA, replacing Bill Scavotto's old record of 3724. John, a gunsmith from Bremerton, was shooting a 222 sleeved Remington, Shillen barrel and stock and was of course of his own building. What a nice way to start bench rest shooting! Just keep it up, John.

Ed Frombach was up to his usual performance with the light rifle and won all the aggregates, but Tom Seitz was breathing down his neck all the way. While running a close second, Tom did set a new range record with a 200 yard group of .500" with the light rifle. This topped Harry Master's old record of .521" set in 1962. Frombach's winning rifle was a 6mm Wasp, sleeved Remington, with a Hart barrel.

After the matches were over Tom Seitz (Pendleton Gunshop) brought out his Remington XP-100 on which he had installed a new Hart barrel in 221, and a Fajen laminated stock. Four different shooters tried it out shooting 5 consecutive five shot groups at 100 yards. The 25 shot agg. was, can you believe, .558 MOA. From a four pound, 11½" barrel pistol it just doesn't seem possible. What a jar to the rest of us XP-100 shooters; we will have to revise our plans!!

The next shoot is May 5, 200 yards and 300 meters. This will be a good chance to get some long range practice for chuck hunting this summer.

A REMINDER, FELLOW MEMBERS: DUES 1968.

Allen Bench, Sec'y
620 So. 19th Ave.
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Unregistered Matches

ST. LOUIS — BENCH REST CLUB OF ST. LOUIS
Apr. 7, May 26, July 14, Aug. 18 and Oct. 13

Hunter Class Match Schedule for 1968

Mar. 17—Izaac Walton League, York, Pa.
Apr. 21—Izaac Walton League, York, Pa.
May 19—Izaac Walton League
June 23—Izaac Walton League
July 21—Izaac Walton League
Aug. 18—Izaac Walton League
Sept. 15—Izaac Walton League
Oct. 20—Izaac Walton League, York, Pa.
Nov. 10—Izaac Walton League
July 7—South Creek
Sept. 8—South Creek
Oct. 20—South Creek
May 5—Council Cup
June 30—Council Cup
Oct. 6—Council Cup
May 12—Sulphur Springs
June 9—Sulphur Springs
July 14—Sulphur Springs
Aug. 25—Sulphur Springs
Sept. 22—Sulphur Springs
Oct. 27—Sulphur Springs
May 26—Hamburg
Sept. 22—Hamburg
June 16—Dauphin
Aug. 11—Dauphin
Oct. 13—Dauphin

CANTON McKINLEY BENCH REST CLUB

Varmint Match Schedule For 1968

April 28	(Warm Up Match)	2:00 P.M.	Sunday Afternoon
May 5	Day Match	2:00 P.M.	Sunday Afternoon
May 25	Day Match	2:00 P.M.	Saturday Afternoon
June 2	Day Match	9:00 A.M.	Sunday Morning
June 15	Day Match	9:00 A.M.	Saturday Morning
June 28	Night Match	8:00 P.M.	Friday Night
July 13	Night Match	8:00 P.M.	Saturday Night
July 19	Night Match	8:00 P.M.	Friday Night
August 3	Night Match	8:00 P.M.	Saturday Night
August 9	Night Match	8:00 P.M.	Friday Night
August 17	Night Match	8:00 P.M.	Saturday Night
August 23	Night Match	8:00 P.M.	Friday Night
September 7	Night Match	8:00 P.M.	Saturday Night
September 14	Day Match	9:00 A.M.	Saturday Morning
September 29	Day Match	9:00 A.M.	Sunday Morning
October 5	Day Match	2:00 P.M.	Saturday Afternoon
October 20	Day Match	2:00 P.M.	Sunday Afternoon

For further information, contact:
Robert L. Moser, 1025 Shadyside Ave., SW, Canton, Ohio 44710

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SAVE THIS SHEET - AS NO OTHER NOTICE WILL BE SENT OUT.

First Varmint Rifle Match	June 9
Second Varmint Rifle Match	July 21
Third Varmint Rifle Match	September 22

All Varmint Matches

6-5 shot matches	@ 100 yds.
6-5 shot matches	@ 200 yds.

Last 5 matches at both ranges computed for Grand AGG.
First match each range is warmup.

STARTING TIME is 10:30 a.m. SHARP

FIRST HUNTER RIFLE SHOOT	August 4
SECOND HUNTER RIFLE SHOOT	October 6

5 or 6 - 5 Shot MATCHES ALL at 100 yds.
Last 5 matches for Grand AGG.

STARTING TIME — HUNTER MATCHES 12:30

LUNCH SERVED AT ALL VARMINT RIFLE MATCHES
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For Further information on Rules, etc., contact:

T. H. Boughton
410 Stone Road
Rochester, New York 14616
Phone 663-7637

Who shoots SIERRA BULLETS?

John H. Bunch, of course!

He fired a **.135" group from 100 yds.** and **.263" from 200 yds.** to win the 1967 Club Bench Rest Championship at Grand Prairie, Texas.

J. E. Ridings, director of the Club, made this comment: "While many bullet companies illustrate small groups shot with unrestricted 'iron monsters' in underground test tunnels, it should be noted that these targets were shot with a heavy varmint class rifle, in a competitive match outdoors on an extremely difficult range."

Mr. Bunch says: **". . . the bullets were shot directly from the box, although I have a bullet indicator I feel no need to spin the 53 gr. Bench Rest Sierra Bullet."**

SIERRA BULLETS
10532 S. Painter Ave. • Santa Fe Springs, Calif.

Minutes of TEXAS BENCH REST SHOOTERS AND GULF COAST REGIONAL WINTER MEETING

Dear Stool Shooters:

The following consists of the 1968 shooting schedule, minutes of the combined Texas Bench Rest Shooters Association and Gulf Coast Regional winter meeting along with a voting card.

The Annual Meeting of the TBRSA was held Feb. 10 in Grand Prairie where registered match dates for the 1968 shooting season were selected and several resolutions reflecting club policy, rules and intentions were passed. President John Bunch called the meeting to order and introduced officers and directors of the organization, after which Secretary A. G. Rogers submitted a financial report. It was approved as read.

The meeting opened with a report by Allan Hall on the team matches held for the first time this year in connection with the National Varmint and Sporter Rifle Tournament. According to Hall, 18 teams competed for the William S. Coleman traveling trophy and most shooters seemed enthusiastic about the team concept.

Following a discussion of rules for the hunting rifle class, Rogers moved that the TBRSA adopt the national rules for this class, with the exception of the weight limit, which would remain at 9½ pounds in Texas. The motion carried.

Directors also adopted a resolution drafted by the Mid-Continent Region, urging National Directors to maintain unchanged present NBRSA rules for a "reasonable" period of time.

Gulf Coast Regional Director J. L. (Pokey) Bonner reminded that NBRSA membership dues (including subscription to **Precision Shooting**) have been increased to $8. Copies of new rule books will be provided all members of the National Association. Cost of printing the pamphlets is to be paid with funds from a bequest by the late Paul Gottschall.

The group also adopted a resolution urging the National Association to advertise bench rest shooting in national publications and encouraging NBRSA President A. H. Garcelon to place bench rest rifle match schedules in the **American Rifleman.** A suggestion that the TBRSA publish a periodic newsletter containing information about match results, schedules, and other information pertinent to shooting activities was discussed but tabled pending further study.

The prospect of providing a "home" range for the TBRSA was noted by Bonner, who indicated that he was considering construction of a range near his home west of Cross Plains. Range facilities would be available for any bench rest competition. Several persons indicated they were interested in contributing toward construction of the facility, but the group decided to take no action in that regard until Bonner had time to draw up tentative plans and submit an estimated cost figure.

In other action, directors moved to amend the TBRSA corporate bylaws, if necessary, in order that officers of the association might be elected at the winter meeting instead of holding election in conjunction with a match during the shooting season.

Meeting adjourned, Signed: Jim Gilmore, Sec'y.-Treas., TBRSA.

Now, this is election year for your NBRSA Gulf Coast Regional Director. In the past the director has been chosen at the annual TBRSA bench rifle shoot; however, the members present at the shoot represent only a very few of the membership of the Gulf Coast Region and in order to give each member a vote PLEASE TODAY write in the person of your choice on the enclosed voting card and MAIL IT. Jim Gilmore, Secretary-Treasurer of TBRSA, will make the tabulations. Keep in mind that your membership in the National Association must be current to qualify as a voter. I am fully aware that this type of election does not parallel Roberts Parliamentary Rule but after having talked to several of the members it was decided to hold the election in this manner.

I very strongly suggest you make every effort to attend these shoots and encourage new membership as all of us know people interested in rifle shooting who need only your help and guidance.

Yours truly,

J. L. BONNER
Director, Gulf Coast Region
National Bench Rest
Shooters Assn., Inc.
Cross Plains, Texas

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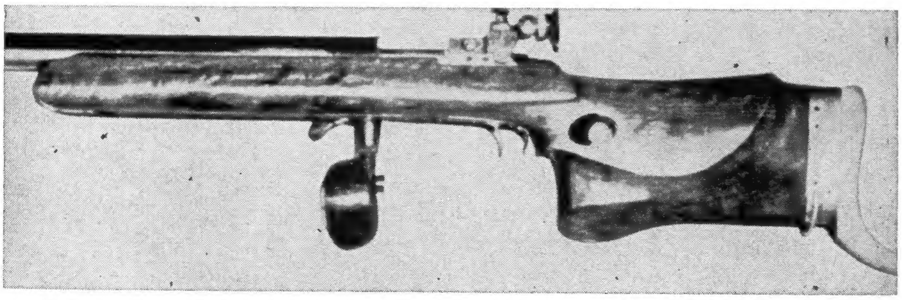

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Referees Appointed

Gentlemen:

As Deputy Director, Eastern Seaboard Region NBRSA, I hereby appoint the following members to act as referees at the indicated matches. The first name listed shall be Chairman Referee. In the absence of the first man the second man shall assume the Chairmanship. If both men are present, only one will serve as a referee. The Chairman Referee and the Club appointed referee shall appoint a third referee.

WAPWALLOPEN, June 1 & 2
  Clarence J. Detsch
  Clyde E. Yocky
JOHNSTOWN, June 15 & 16
  George J. Stannard, Jr. ,
  Gerald B. Southard
SOUTH CREEK, June 22 & 23
  J. Marion Reece
  Kenneth R. Hostetter
SOUTH CREEK, July 13 & 14
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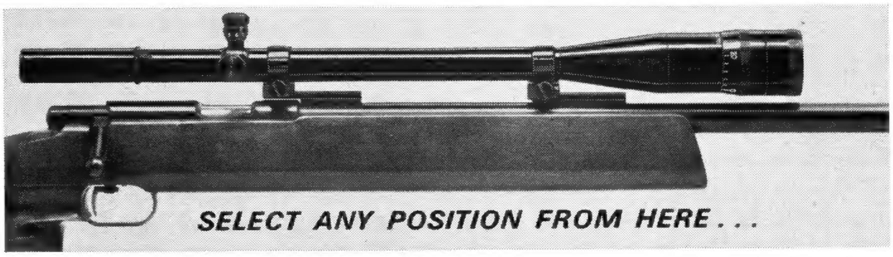

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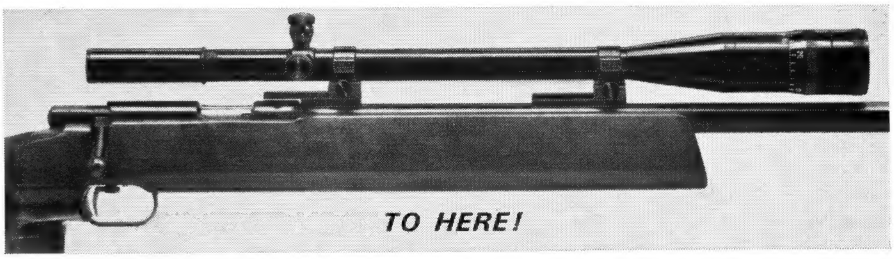

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Research On MORGAN JAMES

(See Cover Illustration)

By DR. A. H. GARCELON

★

Doing further research on Morgan James, I find in the book **Our Rifles** by Charles Winthrop Sawyer a drawing on nine shots at 110 yards made about 1890 with a Morgan James caplock muzzle loading rifle. This is the same diagram or drawing that is published by **Forest and Stream** of November 20, 1890. It states in Forest and Stream that the target was made in 1859 with a heavy match rifle made by Morgan James with a gain twist barrel 30 inches long, a 220 grain picket bullet using circular linen patch and 90 grains of Hazzard FG powder. These nine shots — six of which point into the center hole shot for a group. The tenth shot was omitted through fear of spoiling the group. As Sawyer says, "Modern rifles, attention; Salute!"

More data on Morgan James was obtained from the book, **The Muzzle Loading Caplock Rifle** by Ned Roberts first published about 1940. Roberts points out that Morgan James of Utica, New York, was another of our most noted and skillful makers of muzzle loading rifles that give the finest accuracy. Roberts apparently searched city directories and various sources of possible information at the Utica Library but could find only one item concerning Morgan James and that was in the Utica City Directory of 1859 which lists Morgan James, Gunsmith, corner of Fayette and Seneca Streets and continues listing him in this way each year until and including 1866.

He did find out that Morgan James made remarkably accurate shooting heavy target rifles as well as many lighter single barrel hunting rifles and double barrel rifles that were very popular with hunters. Many of his rifles made their way to the west for buffalo hunting and also were used for shooting Indians in the Indian wars. Some were carried by pioneers to California and Oregon and during the gold rush period. He (Roberts) was unable to find a picture of Morgan James but did gather further information to the effect that James made heavy sharpshooters rifles "with full length telescope sights for Berdan's sharpshooters in the U.S. Government."

Now, to quote directly from Roberts' book, ". . . and two groups that I have illustrated in Chapter 9 show beyond all doubt that his rifles were absolutely unsurpassed in accuracy — possibly unequalled by any other maker. The reader will be obliged to search for a long time and part with many of his hard-earned dollars before he finds any rifle of any make, kind or calibre, old or the most modern, which would shoot a ten shot group at forty rods that is entirely enclosed in a circle but one in 27/50th inches in diameter and the eleven shots all hitting a silver dollar at that range."

The rifle about which I write is pictured on page 214 of Roberts' book and it's the same gun that was owned by John Diplock. He also pictures a rifle owned by Mr. Harold W. Porter of Akron, Ohio that has a full length telescope sight secured by soldering the entire telescope tube to the top of the barrel. This was made by Morgan James. This scope contains cross-hairs that can be raised or lowered to obtain elevations by means of a graduated brass dial affixed to the upper tang of the rifle and the lower part of the rear end of the telescope. Roberts states, "It has often been stated that Mr. R. Noske, San Carlos, California, invented the internally adjusted telescope but this Morgan James telescope refutes this claim as it was doubtless made before Mr. Noske was born."

I had heard that Morgan James made the first telescope sights as we know them today. These were invented, apparently, by a man named Chapman who was an experienced civil engineer, used to the use of the surveyors transit, precision lenses, cross-hairs, etc., and he apparently gave Morgan James the opportunity or the authorization to manufacture and sell this telescope sight he invented. He did not, however, patent the scope or the mounts and other rifle makers copied as best they could, the Chapman-James telescope. However, it follows that from about 1835 or '40 to about 1855 the best rifle telescopes made in this country were those by Morgan James.

It was about 1855 when William Malcolm of Syracuse, New York, established the first formal telescope manufacturing business in the country and produced scopes superior to the Chapman-James scope and all others that were made at that time. These full length telescope sights which extended back beyond the patent breech of the rifle and back of the nipple on which was placed the cap, were important in the sense that there was a lot of carbon, flash and debris flying from the cap when it was fired and if the lens of the telescope was set close to or in front of this area, it would result in the staining or dirtying of the lens of the scope. Therefore, for caplock muzzle loading rifles, it is better to use a scope which extends back of the nipple and cap. This, of course, today is no problem and so is only incidental in the matter of scopes.

Now, as for the rifle itself. It has a stock which is typical of guns of that period. It is one piece — has no fore-end and it is beautifully finished and absolutely mint in every sense of the word. The wood is feather grained walnut and a finish of linseed oil, hand rubbed, shows great depth of grain and wood character. As stated before, there is no fore-end of wood on the rifle. The metal pieces on the stock are all case

(Next page please)

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hardened including the trigger guard, trigger, and semi-scheutzen butt. The case hardening is still in good condition although somewhat faded. An important thing to me is the fitting of the metal parts to the wood of the stock. It is beautifully done. One cannot find in any area a line of separation between the metal work and the wood — that is as the painters say, "there ain't any holidays to be seen in this work."

The trigger is a single set type, fully adjustable from a very light pull to a very heavy pull. It is amazing to me that over the years, triggers of this type do not seem to deteriorate or fail in function. They are undoubtedly finely made because on a number of rifles of this type that I have looked at and inspected carefully, the triggers all seem to be in perfect condition. I could make a snide remark about triggers on present day rifles not being their equal but this is truly a fact of life. These triggers are as finely adjustable as those made by Carl Kenyon or Robert Hart today.

There is a small screw directly behind the trigger which may be turned to adjust the trigger pull. At the muzzle end of the butt stock and a part of the stock section is the so-called "break-off." This was the part to which was attached the patent breech. The only mention that I have encountered of who might have invented the patent breech is in the book **"The Gun and Its Development"** by W. W. Greener in which he states that the patent breech was invented by Nock in 1787 with the object of getting front ignition of the powder charge. Up to that time, barrels had been made with a plain breech plug screwed into the end of the barrel. The so-called breech plug was hollowed out so at least a part of the powder charge would be behind the touch-hole or the nipple, and Nock expected to get better ignition by using this method. So, you can see, some of the recent claims for originating front ignition as a new idea are scarcely true.

There are a lot of theories regarding the interior shape of the patent breech and primarily had to do with the recoil effect on the rifle. Most of these theories were not well-founded, however. Basically it was claimed that if the patent breech or the breech-plug is made square to the axis of the bore the square base introduces additional rearward pressure or in other words, increases recoil. This is questionable. Then new theory was that the base should be on a radius to the axis of the bore and thereby reduces recoil — also questionable.

The patent breech in this gun is tapering, cylindrical in shape and has a rounded bottom — not a square bottom. Roberts, in his book, states that he believes that the interior shape of the breech plug of the patent breech effects ignition but not recoil. Now this patent breech which is the section that screws into the breech of the barrel has a rectangular shaped steel block through which a hole has been drilled running horizontally to the bore of the gun and through this rectangular piece which fitted very closely into the female joint of the break-off or the stock mounting area went a small tapered pin and this attached the barrel, patent breech and stock together into one unit.

Part of the patent breech was the so-called "snail" or sometimes called water drain which held the nipple or tube on which the percussion cap was placed and through which the fire went from the percussion cap to the powder through the so-called touchhole. The patent breech is shaped to conform to the shape of the barrel and is also case-hardened beautifully. The patent breech in turn, screws into the barrel and it is so precisely machined that with just the fingers of the hand one can tighten the patent breech onto the end of the barrel and it practically comes into line. There is a special wrench with this rifle used to tighten the patent breech to a specific point so that the octagonal surfaces of the patent breech fit those of the rifle barrel.

The barrel itself is octagonal in shape, it is 33 inches long and is browned — not blued. It is marked on the top flat "M. James, Utica, N. Y." The barrel has seven lands and grooves. It is .45 calibre and the grooves are more shallow when compared with most of these rifles that I have seen. It is a gain twist and makes one turn at about 53½ inches. The bore is mint and shows no signs of wear or erosion.

On the bottom flat, at the breech end of the barrel, is soldered an attachment that was part of the machine rest arrangement from which this gun was fired. This has a total length of 11-1/8 inches. The first 3½ inches of this metal attachment is squared to conform to the general outline of the barrel, with three sides squared 1, the remaining 8-1/8 inches is a half round. This rode on a way when the gun was fired.

(Next page please)

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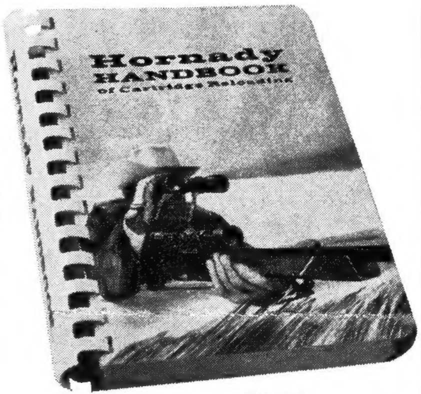

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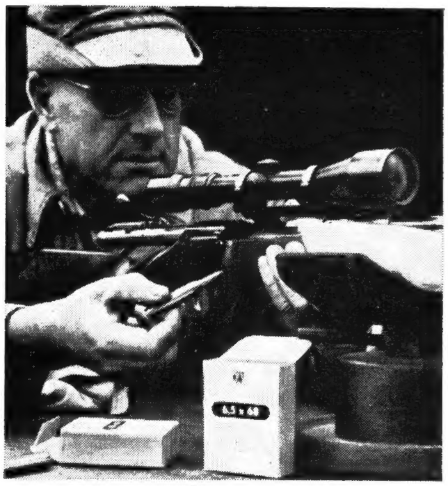

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The only other particular things about the barrel is that on the bottom flat 4¼ inches from the muzzle is a threaded hole into which the screw which held the front rest was attached and about one inch from the muzzle on the top flat is the dovetail slot into which fitted the front iron sight and the front mount of the telescope sight. Anterior to this dovetail slot — or towards the muzzle — are a series of lines which is formed as an arrow head. These lines are .030 inches apart and are engraved across the flat. They are .2 inches in length and are used for measuring the windage adjustment of the front sight. With this type of sight the front mount was simply pushed to one side or the other and a fine point which extended towards the muzzle from the site base rested over these lines and in this way one could decide how much windage was needed and had a line from which to operate.

The gun fires a picket-type bullet with a rounded base. The bullet weighs 230 grains.

The gun is fully equipped with a false muzzle that is held in place with the usual four pegs and has the blinder on the top side so that when one looked through the sights, if the false muzzle was in place one couldn't see because of this blinder.

It is equipped with a bullet starter that is made entirely of brass and the section fitting against the bullet fits the swaged bullet perfectly. The bullet swage is a little bit different from any I have happened to see before — at one end there is a section which screws this in or out, the length of the bullet can be varied considerably. Inside the swage is an insert which is beautifully hand-honed and made so that the finished bullet fits just exactly so and comes out miking beautifully as far as roundness is concerned. The other end of the swage is a very precise fit — so precise that when it is placed in the swage the air pressure is so great that you have to force the piece into the opening in the swage and this section is polished very carefully so that it forms the base of the bullet beautifully.

There is a typical patch cutter with the gun — also a small wooden funnel which fits into the end of the muzzle exactly for pouring powder into the gun. And then there is a wrench which is a finely made piece or equipment fully case hardened that fits the projection on the rear of the patent breech.

The bullet mold is very well made — brass — with wooden handles and it has no cut-off — in other words the cutting of the sprew must be done by hand.

There is one brass tube with the set which has a stopper glued into place and this is used without any question to measure powder. The gun apparently has been shot with a duplex load for there is an additional powder measure. This is a small typical cup-shaped powder measure into which a cork stopper has been driven to a certain level so that a very small amount of priming charge could be placed in the gun.

Interspersed with the equipment of the gun is a very fancy brass hammer with an ebony handle made undoubtedly to drive the bullet into the swage.

The front rest is an interesting piece — that screws onto the bottom of the barrel. It is approximately 2 inches across and it's about 3/4 of an inch in width and a half an inch thick. This is attached to the barrel with a screw and it has engraved longitudinal lines — that is, lines running parallel to the bore on both ends with a slight relief cut out in the center for the screw. It fits the bottom flat of the barrel to perfection.

The brass hammer was undoubtedly used also to drive the pin which locks the patent breech to the stock section at the break-off point, for there is also a pin punch made to fit this pin that locks the gun together so perfectly.

The front mount for the telescope sight has a small arrow shaped projection — this of course was used against the lines that were anterior to the dovetail cut on the barrel. The small pin-head iron sight — (front sight) — also has an arrow which is used for the same purpose. The rear iron peep sight is a threaded piece of steel which has been browned — it's 64 threads to the inch and one side of the threaded area is flattened so that it may be marked for certain distances.

There are four separate boxes of caps contained in a tin box which is part of the equipment — one is marked, "percussion caps, warranted quality, pure mercury, manufactured only for the U.S. Percussion Cap Association" and it was made by a concern in Leage, Belgium. Another box was made in France and is marked "Amorcescanneles" "qualite superieure." There is a loose piece of paper in the case and it reads, "Made in 1844 by Morgan James—heavy target rifle."

One other piece of material that is contained in the case is a large — it's

6 feet long by 3 feet wide — piece of linen from which some patches have been cut but undoubtedly it is a piece of linen that was picked especially to go with this rifle and from which patches are to be made.

Three original ebony cleaning rods are with this equipment — one made for seating the bullets, one made particularly for cleaning, with a jag on one end. There are also two modern cleaning rods that are in the case which undoubtedly was made by some recent owner — probably made by John Diplock.

The telescope sight is unmarked but it it browned and made specifically to fit this gun without any question. The ends are of brass; the rest of steel. I can't guess at the power although it is clear the lenses are obviously dirty. The scope is 39 inches in length.

Having heard that Morgan James was the producer of the first modern telescope sight, that is, the target telescope sight as we now know it, I attempted to do a bit of research to check this out.

One of the most knowledgeable men in the field of gun collecting—particularly target rifles and their accourterments — is John Amber, the Editor of **Gun Digest.** In talking with John, he recommended that I read **The Improved American Rifle,** by John Radcliff Chapman. This is a book published in the year of 1848 and republished in 1941, I believe by Ned Roberts of more recent fame. I borrowed a copy of this collector's item from the National Rifle Association library and proceeded to read it. I found this book to be of tremendous interest not only because it did give me some insight into the origin of the telescope sight as we know it but also because of its various other remarks about shooting, bullets, rifles, barrel twists and a variety of subjects that would be of interest to anyone who is interested in accuracy as we know it in the **Bench Rest** game, for once again I have found out that we are far from being the originators of the term "the ultimate in rifle accuracy"—because it mentions this many, many times. I not only found material which would more or less confirm the rumor about Morgan James and his telescope sights, but I also found information about Morgan James rifles, which interested me very much.

Mr. Clark was obviously prejudiced in favor of Edwin Wesson rifles which were manufactured in Northboro, Mass. He did go on to admit that there were other rifle makers of the day who made rifles equally accurate. In fact, reading carefully, he does admit that the most accurate rifle made was one that was made by Morgan James of Utica, New York. He also admitted that there were other great rifle makers such as Brockway, Fish, Nelson Lewis, and others at that time.

Chapman in his book, **The Improved American Rifle,** published in 1848 after he had lived in this country six years, having come here from England, had the following little statement to make which is quite apropos of present times. He says, ". . . during a residence of six years in this country, I have devoted myself entirely to the use of the rifle as a means of amusement in the woods and at the target, and although some finicking, white-faced townsmen may profess to see no rational enjoyment in hunting or shooting at a mark, I can assure him all people have not the same qualifications and consequently, not the same means and powers of enjoyment. I am inclined to think, that if young men would devote their leisure hours to fishing, hunting, riding, walking, or shooting at a target, the fruits would be somewhat more valuable than those gathered from mawkish dandyism, card-playing, roudyism and debauchery."

I also like this little statement I found in Chapman's book, "I have no object in keeping secret, for private advantages, any information I may be in possession of; for in a case of competition of skill I am willing to rely on being able to practice effectually what I publish so openly." So, the attitude of many present day bench rest shooters and the philosophy of their fine attitude and their efforts in helping one another to improve the rifle and develop the finest type of competition was present at least in the mind of one man in 1848 who shot in this type of competition.

We now come to Chapman's description of his telescope sight. This goes to confirm what Ned Roberts has said and that is that Chapman was the first man to develop and have made a telescope sight similar to the scopes that we now use in shooting. He says, and I now quote, "I shall now proceed to describe such improvements in sighting which I have lately effected by the introduction of a telescope sight and movements connected therewith, which will perform perfect at all times." One can see from this statement that Mr. Chapman was prone to make the same mistake that many so-called experts in the gun field make and this is to make a positive statement. This should seldom be done because very few things are absolute in the gun area although one views many statements by writers (gun) that are extremely dogmatic and therefore questionable. Little did he know then that we have problems even today with telescopic sights and to the best of my knowledge there is no scope sight which performs as he says "perfect at all times." In fact it is very difficult to find a scope sight today that will perform perfectly even part of the time — or ever. This certainly is an area in the shooting game which would stand marked improvement and is open for inventors and developers to improve.

He continues, "The tube in which the lenses are fixed is three feet, one inch long, 5/8 of an inch in diameter outside and 1/20th of an inch thick, weighing about 10 ounces. It can be made very good and stiff from sheet iron brazed at the joint, floated and leaded out. However, sheet steel is preferable. To the front end a saddle of steel is firmly fitted and brazed and a narrow flat rib is soldered over the brazed joint of the two. The object to be obtained being stiffness combined with lightness; for when fixed on the rifle a discharge has a tendency to pitch it forward and break out the dovetail or neck off the pivot screw; and this tendency increases as the charge of powder increases. A carriage is made to slide through the bead sight dovetail, furnished with two standards, through which two screws pass into the saddle, serving as axes or pivots of elevation or depression. The back

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movement for elevating or depressing without taking out the telescope dashes is designed to adapt itself for all ranges, keeping the charge of powder and the sighting always alike, a property which the common globe sight does not possess; for with it no nearer approach can be made than half turns and I have never seen one work truly with half turns; consequently, you cannot work nearer than one turn.

"It is also used as a globe sight by the insertion of a piece of circular steel with a hole in it. All my best rifles are fixed off in this manner, so that either a telescope or globe sight can be used with very little trouble, for the front movement of the telescope works on the same dovetail as the bead sight does, and the back movements serve, as I have just described, for a globe sight. I am aware that telescopes have been in use for some time, but to my cost, I know that they never did perform as well as the globe sight until made and used as above described, and which I once thought of securing by a patent, but found that the trouble and expense would overbalance the profit." That there were telescopes in use before this, he admits because he continues, "The old telescopes were universally shorter than the barrels, and set into them by a dovetail not far from the break of the charge; their movements very unmechanical; proving fruitful sources of error along." He states, too, as he continues, that the greatest cause of error in the use of the short telescope was derived from the heated atmosphere radiated and refracted as he said, from the surface of the barrel in front of the object glass and he said, too, that the higher the range of power the greater the aggravation from this. This was one of his reasons for feeling that a long telescope was better than a short one. He also felt that a short telescope had more movement in it than a long one.

He goes on quite extensively about paralax and its problems which he considered to be the chief problem of sighting. He continues making a point of preferring an object right side up rather than inverted in a telescope sight although he says the inverted one is just as good as the one that is right side up or has an erecting eye piece. He continues, "These target telescopes are made by Morgan James, Riflemaker, Utica, New York, and with front and back movements cost about $20. A pair of crosshairs are fixed in this telescope for the purpose of sighting at a mark, and are fastened on a new plan invented by James, which cannot be affected by the vibration of the weapon, and particular attention is paid to the seating of the lenses, and the fastening and fitting of the tubes in which they are set to the tube of the telescope."

He pictures some targets that he shot: number one he shot without paying any attention to the wind and, therefore, got marked lateral dispersion; target number two, paying careful attention to the wind, he tightened up the group considerably; target number three, fifteen shots at 34 inches — this is string size, fired by a James rifle; target number four was shot with an exceptionally large James rifle which weighed 33 lbs. and had 38 bullets to the pound, calibre, and carried a one ounce picket bullet with "five calibres of powder."

Another target was made by Captain W. Tisdale of Utica with a James rifle using telescope sights and measures 9-5/8 inches from center to center and is, as he says, "the shorttest ten shot string at forty rods that I ever knew made. Such is the progression of knowledge and art!" When one considers that this target was made at 220 yards it isn't bad shooting even for today.

It is interesting, these targets were placed in a book to demonstrate certain shooting techniques and problems. The most important one of which was wind and he advises, finally, that one cannot wait until the flags are all exactly the same state as they were when he commenced the string, but he may have to wait for an hour before the recurrence of that condition will occur or take place. The plan he adopts and advises is to "avoid all the heavy gusts and streaks as much as possible and fire in the intervals when the wind is more moderate, forming my judgment from a comparison of the then state of the wind as indicated by the flags, with its state at, and effect on, the last shot." In other words he held over for the wind and used judgment.

He advised also when sitting at the bench to sit in a position at ease but not too loose, as he said, he must hold the weapon firm but not tight enough to strain his muscles. He must not fire too quickly after being seated, but take especial note of the indication of flags with regard to their comparative state with the last shot and their general appearance indicative of a change in the direction or a general increase or diminution in strength of wind. He canted the rifle on occasion to change his sight picture rather than to push the weapon from one side to the other, especially when using iron sights. But he did say that this required a tremendous amount of skill and knowledge to make it work correctly.

It is interesting in reading the book, too, to find that even in those days they had fellows who had a tendency to attempt to evade rules perhaps, for he speaks of not using any extraneous help, such as wipers, ramrods, sticks, or some the "Mississippi dodge" by having a jointed rest attached to his body, and running along his left arm, and by a simple movement making it as stiff as if mesmerized or case-hardened. He was speaking of off-hand shooting when he mentioned this.

For those interested in lubricants, you might like to know that he felt that a good bear's oil was far superior to the lamp oil or Florence olive oil. In fact, he thought that bear's oil was better than fish oil or squirrel oil, or coon oil or even deer's leg oil. Some of the experimenters in the lubricant field might enjoy trying to revive some of these oils and test them out.

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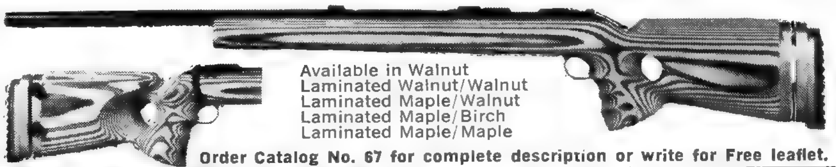

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He speaks further about telescope sights by saying, "but I can assure those who feel competent to use a telescope sight, that when properly made and fixed upon their rifles, with a careful application to practice, they will never regret the outlay of $20 on this instrument and fixtures. No more dovetails and defacing of the weapon are necessary than what are required for the globe and bead sight, the front movement of the telescope being effected in the bead sight dovetail, and the back movement of the globe sight. This is a great recommendation so far as appearance and simplicity are concerned for the telescope can be taken off and the globe and bead sight substituted in half a minute, and no one be aware that such an instrument was ever used upon the weapon. Besides, who would wish to be straining and stretching his eyes on a dull day, to ensure the eccentricity of the bead sight, when with a telescope, he can center a dime at 40, and see a bullet hole at 80 rods?

In another section "In the manufacture of telescopic sights" such as previously described the author says, "I beg to recommend M. James, Rifle manufacturer, Utica. He is a first-rate 'working-mechanic' and having been employed by me in all work connected with the telescopic sight, can give better satisfaction, — 'having been through the mill' — than those who have not."

Mr. Chapman would have fit well into the bench-rest shooting game today as he speaks on many occasions of the methods of shooting and the procedures carried out by him when shooting. He counted the number of times that he ran the cleaning rod through the rifle. He even tried to specify the amount of spittle that was placed on the cleaning rag so that the bore would be left damp and yet not too damp. He weighed his powder; he weighed his bullets. In fact, he might have been more careful than most of us for in one section he says, "To guard against this, the powder must be carefully dried, and all the particles of dirt, cork, and lumps of powder picked out and thrown away. A piece of cork as large as a pea, in a charge of powder, will be the means of a bullet striking the target six inches below the average height at 40 rods."

He was also very careful about the type of linen used in patching the bullet and making sure that the general thread structure of the linen was the same and not heavy and light as in many cases of linen.

There is a supplement to the Chapman book written by Ned H. Roberts, published in 1941, and some of the remarks he makes are very interesting also because he mentioned Morgan James on several occasions. He mentioned quite a number of improvements and changes that had been made since 1840-50 to the present. He also said that the modern benchrest rifles do not make the groups as yet that are competitive with those made by rifles by James, Warner, Brockway, etc. I might quote Roberts, "To the best of my knowledge and belief, the 'world's record' 40 rods, ten shot groups are the Morgan James group measuring 3 and 27/32 inches, shot by him in September 1859 with one of his 40 calibre gain twist rifles, using a 210 grain modified picket 'bullet' and that shot by Carlos Gove, May 21, 1891 with one of his 45 calibre rifles having a uniform twist of rifling using a two-piece cylindrical bullet with paper patch weighing 485 grains which group measures 3 and 29/32nds inches."

International Match News

By GARY ANDERSON

April 25, 1968

Important decisions regarding the training and organization of the 1968 American Olympic Shooting Team were reached by the International Shooting Committee and the NRA Directors during the NRA Annual Meetings at Boston on April 5-10.

Our preparations for this year have had to face the incontestable evidence that the 7350-foot altitude of Mexico City does have an adverse effect on shooting results. William Pullum, America's rifle team coach at the 1966 World Championships, concluded after extensive observation during last fall's Pre-Olympics that the scores of the top rifle shooters, those shooting over 1140, would be significantly lower. The shooter who normally takes 10-12 seconds to fire a shot is not able to sustain his performance this long nor is he able to see his calls accurately during the last part of his aiming period. Siegfried Arnold, the Russian-trained West German national shooting coach, indicated that the time taken to fire the shot might have to be reduced as much as 50% and that no longer than 5-7 seconds be taken.

This year's shooting team, which will be selected at the final try-out at San Antonio in July, will undergo high altitude training at Santa Fe, New Mexico. In accordance with IOC and USOC decisions, this special training cannot start until September 15. Because available medical evidence shows that adjustment to altitude is individual and often very different, two alternates for each event will be taken to the high altitude training site.

The Olympic Shooting Team Captain, former World Center-Fire Pistol Champion Harry Reeves, and the adjutant, Col. Jim Crossman, were chosen at the last International Committee Meeting in November. In Boston, the decision was made to select three coaches for the rifle, pistol, and shotgun teams. Two armorers will be sent; one for rifle and one for pistol and shotgun. These men will not be chosen until after the final try-outs so that they can be selected from those armorers and coaches who work most closely with the men who actually make the team.

Since the USOC will not permit organized high altitude training before September 15, it is important that this year's team candidates have themselves as well prepared as possible before the final try-outs, especially the rifle and slow-fire pistol shooters who will experience the most serious effects of high altitude. The most important factors in making this adjustment are physical condition, body weight and speed of firing. Weight reduction and a physical training program which includes exercises such as running so that cardiovascular efficiency can be improved, should be important steps in each shooter's training program this year. Team candidates in the slow-fire events should also concentrate on reducing the holding time for the shot to about 5-7 seconds.

If Thailand's bid for the 1970 World Shooting Championships is not successful, the United States hopes to invite the ISO to hold this championship on the Black Canyon Range at Phoenix, Arizona. In order to encourage the City of Phoenix to proceed with necessary construction on these ranges, the Board of Directors voted to hold the U. S. National International Championships at Phoenix for five years starting in 1970. America was forced to withdraw its bid to host the 1966 World Championships, but this year's bid will not be predicated on the need for major government support. We are now much closer to returning the World Shooting Championship to the United States for the first time in 48 years.

Pressure Factors
IN CENTER FIRE RIFLES

By LLOYD BROWNELL
Professor, Departments of Chemical
and Nuclear Engineering
The University of Michigan

and

By WARREN PHILLIPS
Graduate Student in
Mechanical Engineering
The University of Michigan

and

By THOMAS BLACKWOOD
Graduate Student in
Chemical Engineering
The University of Michigan

(Continued from March 1968 issue)

★

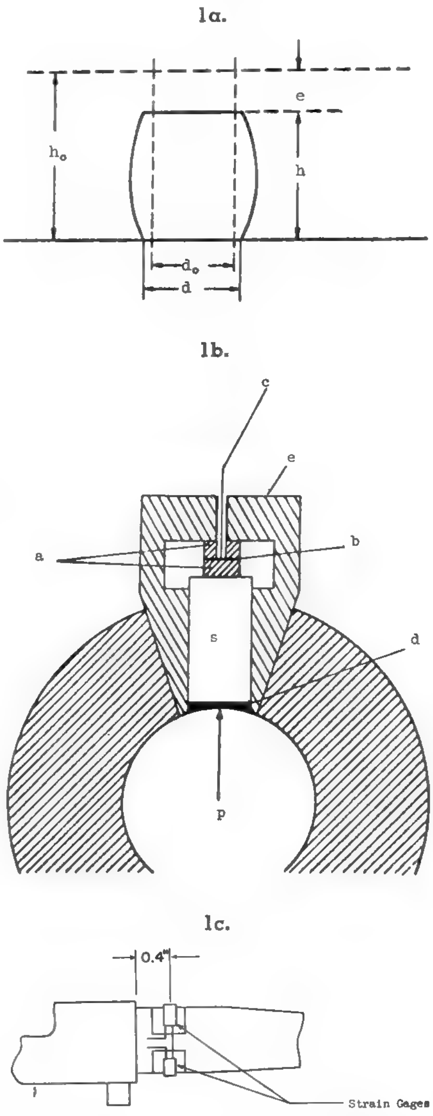
The Crusher Gage

The crusher gage consists of a solid, soft copper cylinder, or crusher, which compresses under the influence of pressure. The magnitude of the pressure is deduced from the extent of this plastic compression. Figure 1A shows that before compression, the diameter of the crusher was (do) and the height, (do). When the crusher was deformed by presure, its height decreased by compressive strain (e). The value of (e) is measured with a micrometer up to 0.0001-inch accuracy, and is then used as a measure of the pressure exerted on the crusher. In order to obtain the relationship between the pressure and the plastic strain (e), the crusher is calibrated by applying selected known pressures to it in a press. A table of maximum pressure versus compression of the crusher can then be compiled. This calibration procedure should be repeated for every new batch of crushers received, because of the variations in yield stress and plastic strain characteristics.

For measurements of pressure in small arms, special "pressure-test" rifle barrels are used. A hole in the top of the chamber is fitted with a close-fitting steel piston which moves up and down with pressure. The crusher is placed on the piston and held in position from outside the chamber by a strong screw. The gas pressure is thus transferred through the piston to the crusher.

Crushers are quite simple devices to use, but they are associated with certain factors of error. The "pressure" they measure causes a permanent deformation of the copper, the amount of which is dependent in part upon the length of time that the force is applied. Thus, the plastic strain (and, hence, the degree of deformation) may be quite small if the pressure is only applied for short time periods. Small arms, especially, involve very short time processes. The time period during which the maximum pressure acts is only a minor fraction of the time involved in the total combustion process. Thus, only very minor compressions will result during test firings in comparison to the statistically determined compressions for the calibration curve which were produced in a press over perhaps 30 seconds.

Dynamic calibration can be used to minimize the errors caused by the short time intervals. A steel hammer is dropped mechanically from various heights, each time on a different crusher made from the same copper rod. The amount of plastic strain (e) for each test is measured with a micrometer. The force applied is then calculated from the known work done by the weight of the hammer and the amount of compression. Since the force of the hammer acts on the crusher for only a minute time period, i.e., about 0.002-second, this procedure simulates better the process actually occurring during firing. However, another error is introduced, namely, that while in the firing process the gas pressure increases slowly to a maximum value, in the dynamic calibration, the maximum force occurs upon contact with the crusher. But perhaps the greatest inaccuracy in both methods of calibration, is the difficulty of predicting the deformation process with sufficient accuracy. In spite of these limitations, however, crusher gages have been widely used for the measurement of maximum chamber pressure.


1a.

1b.

1c.

Figure 1. Examples of devices for measuring chamber pressures in small arms: 1a) crusher gage; 1b) piezo gage; and 1c) strain gage.

The Piezo Indicator Gage

While the crusher gage only provides a measurement of maximum chamber pressure, the piezo indicator gage is the first instrument which made it possible to record gas pressure over a time interval. To explain the principle of this device, it is necessary to go back to 1880, when the Curie Brothers discovered that electrical voltages were developed in some crystals, e.g., quartz, as a result of applying pressure in certain directions and on certain crystal planes. Later it was discovered that the magnitude of the electrical voltage signal was directly proportional to the mechanical load, e.g., the signal increased as the load increased. This effect was called the "piezoelectric" effect.

The proportionality in the piezoelectric effect offers an excellent opportunity for the measurement of pressures with a linear response by means of a voltage signal. Figure 1b shows a simple device used in a German pressure-test rifle which demonstrates the piezoelectric effect. Two quartz crystals (a) of equal polarity are located between the piston (s) and the support frame (e). Both crystals have conducting surfaces (b) on their inner sides. These surfaces are connected by insulated lead (c) to an electrical measuring instrument, which measures the voltages produced. If a pressure (p) is applied to the piston surface (d), the measuring instrument will register a voltage change, which increases in direct proportion to the growing pressure.

The importance of establishing the linear relationships of pressure with voltage signal will be made clear in later discussions of ballistics correlations.

The Resistance Strain Gage(3)

The resistance strain gage operates on the principle that a change in strain produces a change in electrical resistance. This change can be used to determine the strain produced in a wire. The strain produced in the wire then gives an indication of the elastic strain in a structural member to which the wire strain gage is bonded.

Different materials exhibit different resistance changes as a result of strain. Some materials have a linear relationship between change in resistance and change in strain, whereas others exhibit a variable relationship. A linear relationship is generally desired in a strain gage. The simplest strain gage consists of just a wire that is mounted under tension between two supports. In this case, any relative movement between the two supports can be detected through the change in strain that results. This simple wire strain gage could also be cemented directly on the material to be tested. A modification of this gage is the bonded wire strain gage. This gage consists of a wire that is bonded to some thin backing such as paper or plastic, and which will offer essentially no resistance to strain of the part to which it is attached. The backing is then cemented to the part to be tested. The bonded strain gage is a vast improvement over the wire gage, which is difficult to install. Another type of gage commonly used is the etched foil gage. Here, excess foil is removed by etching to provide a thin, strain-sensitive element.

The type of strain gage used in the pressure measurements at the University of Michigan is the Baldwin-Lima-Hamilton type C-1 strain gage. It consists of a thin iso-elastic (Ni, Cr, Mo) wire which is cemented to a paper base. The sensitive element of the gage is covered by a rectangular piece of felt for protection (see fig. 1c).

Prior to applying this gage, it is necessary to thoroughly clean the surface of the barrel to which it will be attached. This can be accomplished by acetone or other suitable cleansing agent. After the surface of the barrel has been cleaned, the barrel is coated with a fairly thick layer of Duco cement, and then the gage or gages are applied. A clamp or wide rubber band is placed over the gage so that pressure is applied to the felt covering the gage. Enough pressure is applied to the felt to force out cement from under the paper base and eliminate all the air pockets. Pressure is maintained until the cement is dry (usually about 20-30 minutes), and the clamp or rubber band is then removed. The cement is allowed to set for some 36 hours prior to using the gage. This setting time can be cut down if Baldwin-Lima-Hamilton SR-4 cement is used in place of Duco cement.

The location of the gages on the Springfield model 1903 A3 test barrel is illustrated in Figure 1c. The gages are located so that the center of the sensitive portions of the gages are directly opposite each other. Care must be taken to insure that nothing touches the strain gages or

(Next page please)

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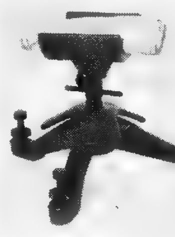

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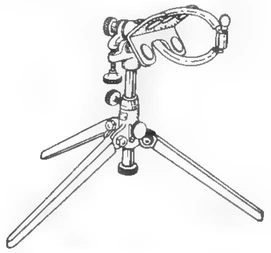

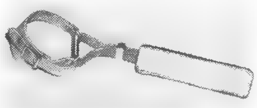

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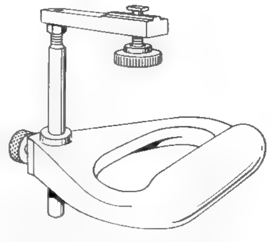

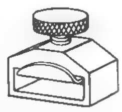

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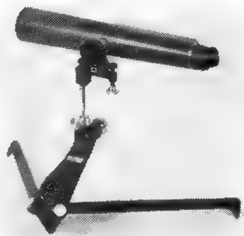

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leads while strain measurements are being taken.

An Evaluation of Pressure Measurement Techniques

Elsewhere(4), Brownell and York criticized the crusher gage rather severely, calling it an archaic and inaccurate device for measuring chamber pressure in high-powered rifles. Dr. W. F. Jackson, Assistant Director of Research and Development at Dupont, replied with an expert's discussion of the pros and cons of the use of the crusher gage. With special permission, this letter was published along with the article by Brownell and York, and is reproduced again below because it states so well the various reasons for the long life of the crusher gage in ballistic measurements(5):

Defense of the Crusher Gage

"I must put in a word in defense of the crusher method — not because of its accuracy, which it does not have, but because it has been a simple indicator used in a reasonably standardized fashion for many years by both commercial and military ammunition testers and developers. We recognized at least 30 years ago that the crusher method would have been better served if "psi" had never been appended to the numbers on a tarage table. In the first place, the tables are prepared by calibrating compression as a function of load on a dead weight press. Even though the copper has been carefully treated during fabrication, and the deformation under static load determined with considerable precision, it is well known that the same deformation is not encountered under dynamic loading.

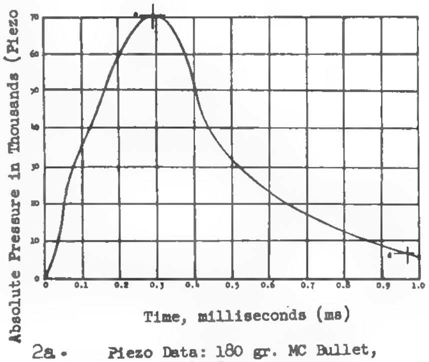
"The results of crusher tests in guns might better have been reported as millimeters or mils from the beginning. The fact that increments of compression for a given increase in load are not constant as the load is raised is not surprising in view of both work hardening and increase in diameter as compression proceeds. The tarage table does take care of this. The real discrepancy lies in the difference between defection under dynamic vs. static loading.

"In spite of this situation, the community of gun, ammunition, and powder makers, aware of the fact that they should bite their tongue every time they attach "psi" to a crusher measurement, have found the crusher method a handy day-to-day procedure for powder and ammunition test, fairly reproducible at different stations, and by process of trial and error used it as a guide in gun and ammunition design.

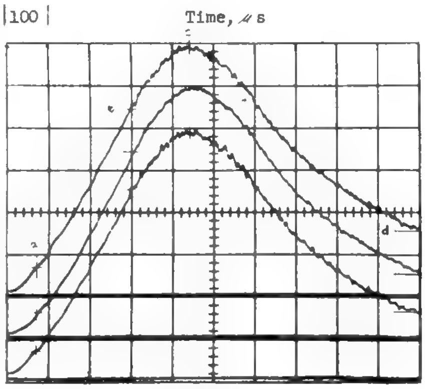
"Conversion to a more scientific method of pressure measurement has met resistance in both industry and the military because of the tremendous backlog of crusher data available and the relative complexity of piezoelectric, magnetostriction or strain gage equipment needed for the methods that operate within the elastic limits of the pressure sensing elements involved.

"I do not believe the powder companies have really been reluctant to bring this situation to the attention of the handloader. Rather, for many years, both the powder and ammunition companies refrained from discussing with the handloader pressures measured by any method. Only recently, with so many scientists and engineers involved in shooting as a hobby, have the powder companies found it desirable to share their information on pressures with the handloader. 'Pressure' I should put in quotes, because the data so far presented to the handloaders are crusher data.

"Your paper should go a long way toward educating the shooting fraternity in this complex area. I believe, however, that there is still more to be done before any method can be called the last word. Calibration of the strain gage method by more direct means than those used so far would be desirable. Location of the measuring point along the chamber is another factor that deserves attention.



2a. Piezo Data: 180 gr. MC Bullet, 35.0 gr. IMR 4198 Powder. P_{max} = 70,500 psi, M.V. = 2620 ft/sec. Copper Crusher Data: M.V. = 2540 ft/sec., Crusher Value = 60,800 psi.



2b. Three replicate firings of 53.0 gr. IMR 4064 powder, 150 gr. Rem. SPCL bullet with new Rem. cases and Rem. primers.

Figure 2. Pressure-time curves for 2a) Piezo and 2b) Strain gages. (Negatives of oscilloscope display.)

"All of this I am writing only to suggest that your readers may get too dismal a view of the crusher method from your presentation."

The above letter was written to Mr. Brownell by Mr. W. F. Jackson, Assistant Director, Research and Development Division, E. I. du Pont de Nemours & Co.

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Reading the Pressure Signal

Both Piezo and strain gages require an instrument which will record the electrical signal they produce, i.e., a rising voltage with rising pressure, and translate it into pressure versus time. The instrument most often used for this is the oscilloscope. The oscilloscope contains a cathode ray (electron beam) tube, which is in some ways similar to a small television tube in that both have cathode rays and fluorescent screens in them. The voltage signal from the pressure gage is fed into the scope so that the electron beam will be bent upwards in direct proportion to the voltage; this beam strikes the fluorescent screen of the tube and is recorded on a rectangular graph superimposed on the tube. Figures 2a and 2b show negatives of oscilloscope recordings. To measure just one pressure curve as a function of time, only one scan on the screen of the scope is needed. The time used in making this scan can be adjusted. Thus, since in the conventional center-fire rifle only about 1 1000-second (one millisecond, 1 ms) is required for the bullet to reach the muzzle after the primer has ignited the powder, the scope is usually set to make one sweep in 1 ms.

On the other hand, to observe the chamber pressure after the bullet leaves the muzzle, the scope should be set at 2 ms. The initial rise in pressure as the powder begins to burn can be used to "trigger" the scope. The triggering allows the scope to make its single sweep during the next 1 ms, if we are using the 1 ms setting. The proportionality of the bending of the beam with voltage shows up on the screen, so that if we have a maximum chamber pressure of 30,000 psi and a calibration of 10,000 psi per centimeter, the electron beam will travel upwards to a maximum of three centimeters. The grid has ten 1-centimeter horizontal divisions; thus one centimeter in the horizontal direction represents 0.1 ms or 100 microseconds because there are 1000 microseconds (millionths of a second) in 1 millisecond. The sweep will travel horizontally 10 centimeters for a 1 ms sweep.

Now, if we fire another load with a higher pressure, say 60,000 psi, the electron beam will be bent upwards 6 centimeters, or twice as high, because 60,000 is twice 30,000 psi. And, again, the horizontal sweep is 10 centimeters. This is what we mean by a "linear" relation between the pressure and the measurement.

The electron beam of the oscilloscope produces a fluorescent line on a dark background. To preserve the record of the pressure versus time, this display is photographed. On ordinary oscilloscopes, such as those used to show the heart pulse, the scope is set to make new sweeps continuously so as to obtain a continuous picture of the magnitude of the pulse with time. As the picture is constantly changing, the life of the screen's fluorescent response is selected to be sufficiently short so that the first image is erased before the second image appears. A polaroid camera attachment can be used with the shutter set to open for one sweep to make this scope useful in pressure measurements.

Another type of oscilloscope known as the "storage" scope has a screen with a much longer image life. The Tetronix 564 is an example. The image may be retained for many minutes, which allows replication of a number of firings in a series all at the same settings to minimize external sources of error (see Fig. 2b).

Figure 2 shows both a redrawn pressure-time curve (2a) obtained with a Piezo gage (courtesy of Dupont) and a photocopy of a negative of a polaroid picture (2b) taken with a 564 Tetronix 564 storage oscilloscope. The peaks of the curves show that much more information than maximum chamber pressure can be obtained in 1 ms with such an instrument.

In the next article in this series, we will take a look at how bullet mass affects the maximum chamber pressure. We will also compare linear (strain gage) and non-linear (crusher) measurements in this analysis.

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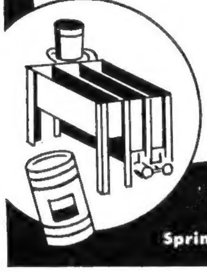

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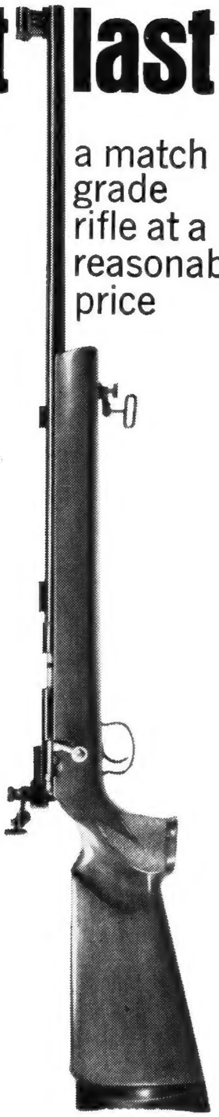

Here is an intermediate target rifle by Anschutz, builders of the Match 54 rifle that was used by **all** the winners in the smallbore shooting events at the Tokyo Olympics.

The 64 Savage/Anschutz has special features that add up to X-ring accuracy: a satin smooth single-shot action; trigger adjustable for pull, creep and backlash; a precision rifled and hand-lapped medium heavy barrel. Target stock has raised cheek-piece, deeply fluted comb, checkered contour pistol grip. Beavertail fore-end has long rail with instantly adjustable sliding swivel; adjustable rubber butt plate. Model 64 costs only **$79.50;** 64-S complete with Redfield Olympic sights as shown, only **$99.75.**

For free catalog write: Savage Arms, Westfield 210, Massachusetts 01085. Include your ZIP code.

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Letter to The Editor

133 State Street
Augusta, Maine 04330
April 18, 1968

Emory L. Tooly, Editor
Precision Shooting, Inc.
8 Cline Street
Dolgeville, N. Y. 13329

Dear Emory:

Last Fall I had the pleasure of speaking to the Montana Rifle and Pistol Association. I met several members of the Montana State University rifle team. I noted that some of the shooters were young ladies, but never dreamed of their importance to the group until I received a letter from Jack Greenway, coach of the team. He stated that two young ladies of the team had been nominated for "The Montana Sportsman of the Year Trophy."

The point in placing Jack's letter in PRECISION SHOOTING is to let our membership know how much two young ladies can do to create a good public image. THEY DO DESERVE AND GET OUR WARMEST CONGRATULATIONS.

Dr. A. H. Garcelon
President NBRSA

* * *

Montana State University
Bozeman, Montana 59715
March 1968

Dr. A. H. Garcelon, President
National Bench Rest Shooters Assn.
133 State Street
Augusta, Maine 04330

Dear Dr. Garcelon

On March 16, 1968, The Montana Sportswriters Association nominated 18 individuals for the annual award of "THE MONTANA SPORTSMAN OF THE YEAR TROPHY." Eight sports or sports related fields were represented among the nominees. Of these, four were football players, four basketball players, one Olympic skater, one rodeo champion, a professional boxer, two athletic directors, and TWO COLLEGE SMALLBORE SHOOTERS. Miss Cathe Curnow, K.O. House, Montana State University, Bozeman, Montana and Antonia Rhein, Hannon Hall, Montana State University, Bozeman, Montana were the shooter nominees.

Even though the nomination itself is quite an honor, I feel that the girls deserve public recognition among the entire shooting fraternity. They have not only helped gain a great deal of favorable publicity for our Montana State University, but have also gained a great deal of favorable publicity for the sport of competitive shooting as a whole and at a time when such publicity is priceless.

Here at State and all over the Pacific Northwest, we have been trying to get rifle shooting the recognition that it deserves in our colleges and to the public in general.

The girls' addresses are above should any of your aggregation wish to send them a congratulatory note.

Thanks a million for your consideration of this request. Best of luck to your Maine shooters and your National Association.

Sincerely yours,

S.G.M. Jack W. Greenway
Montana State University
Rifle Team Coach
Bozeman, Montana 59715

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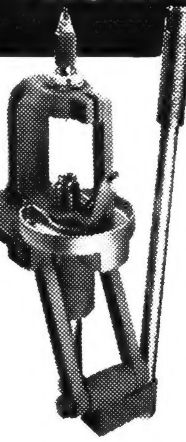

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Letters TO and FROM

M. H. Walker
RD #1
Mohawk, N. Y. 13407

Dear Mike:

I received my **Precision Shooting** yesterday and will make a suggestion as requested in the February issue. It may sound stupid, but sometimes unusual things might just work.

I don't think you could rule out the professional gunsmiths from competition without some real bad results, but if they took a poll among the gunsmiths to see if they would volunteer to shoot only for world records and/or personal satisfaction; or proof of craftsmanship, and not for **match win** or **aggregates.** This would give the amateur a break to win recognition and the gunsmiths a chance to prove out their equipment and skill. The amateur could also compete for world record.

There has always been a feeling that the gunsmith saves the best barrel, bullets, bedding, etc. for himself, and the customer gets second best. Maybe if the customer is the winner the gunsmith's reputation would be further advanced and he would profit more in the end.

We seem to have professionals competing against amateurs and the man with the best machine tools or money to spend for the high price work stands to win.

Barney Auston was always prone to give his best for the customer and would have more work than he could handle. I am sure the gunsmiths are doing the same thing, but it is hard to convince the customer if he competes against him, and wins all the time.

I have a lot of bench rest trophies, won 15 years ago, and they sit out in the garage to gather dust. I would rather have a customer tell me he has a one holer I fixed for him than to win a few matches; besides I need the work to keep busy.

Very truly,

Charles L. Neumann
2907 So. Irvington
Tulsa, Okla. 74114

Mr. Charles L. Neumann
2907 So. Irvington
Tulsa, Oklahoma 74114

Dear Mr. Neumann:

Thank you for your suggestions on the NBRSA matches. Your suggestion adds up to classifying shooters in either professional or amateur class. This same suggestion has come from several sources and may be the answer. However, it introduces some problems which increase the difficulty of running registered matches.

We all need to realize that the equipment and personnel needed to run a registered NBRSA match are almost prohibitive now. The target detail at any match is required to change the record targets, the moving backer, and at National Matches, the stationary backer. Keeping these targets in the proper order and properly hung before and after each relay is a real tough job requiring a minimum crew of four people at a match of any size. In addition, the statistical work of measuring and recording each target, averaging the aggregates, selecting winners, and posting the results also requires a crew of four minimum if the job is done properly.

These above conditions are the main reasons why the Eastern Region now has only five ranges holding registered matches in the Varmint and Bench Rest classes. Those who have dropped out are DuBois, Olean, Lewistown, Oil City, Wilkes-Barre, Dryden, Trenton, Altoona, Plainfield, and others.

So you can see we need to consider seriously any extra work placed on running a match. We now have three Varmint classes and two Bench Rest classes plus the Hunter class, which is not registered. No range even attempts to hold matches for all classes at once. Only two ranges in the East will hold matches for all of the Varmint classes. The largest shoots generally are held for the two largest classes — Open and Heavy Varmint.

Even though the Southwest and Gulf Coast have some of the best ranges in the country, the activity at most of these ranges is considerably curtailed. **The only answer I can come up with is to make it easier to hold a registered NBRSA match,** and to increase the attendance at these matches. The suggestion to establish an Amateur and Professional class would probably increase attendance, but would place an added burden on the match operation. To alleviate this condition, we could eliminate some of the present classes. I personally, and many others, would be in favor of eliminating the Light Varmint class and combining the Open and Limited Bench Rest classes. This would cut the list to three classes— a big help.

Another suggestion which has merit is to have registered matches in the Varmint classes for score only, as we now do in Hunter class. This would not necessarily eliminate shooting for group as now. New ranges could get started easily by shooting for score only and the matches could be operated much the same as NRA small bore.

Thanks again for your suggestions. It is hoped we get more from other interested individuals.

Sincerely

M. H. Walker, President
Precision Shooting

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THE GUN CLINIC

81 Kale St. Mahtomedi, Minn. 56557

Now the Remington Model 40XB target rifle is available as a center fire repeater.

The 40XB center fire is designed with clip slots for the conventional five shot clip. It loads from the top of the receiver and the magazine has a hinged floor plate. Clip slots are provided only in calibers with 308 head diameter. Repeating model is available in 7.62 m/m Nato (308), 222 Rem., 222 Rem. Magnum, 223, 6 m/m x 47 m/m, 6 m/m Rem., 6 m/m Int., 22-250, 243 Win., 6.5 Rem. Mag. The 40XB center fire repeating rifle is ideal for the rapid fire events, especially in the 7.62 m/m Nato (308) caliber, because of its shorter bolt throw and extreme accuracy, plus its optimum weight for "over the course" competition.

As a single shot model, the Remington Model 40XB center fire is offered in several center fire calibers as listed at right. The action is hand bedded and the barrel is free floating . . . for superior accuracy. The heavy barrel model meets the National Bench Rest Shooters Association rules for the Heavy Varmint Class with most target telescopes. (Max. weight 13½ lbs.) Standard barrel model can be made to fit the NBRSA Light Varmint Class rules by using a light scope and removal of wood from beneath the barrel and butt plate. (Max. weight 10½ lbs.) Stainless steel barrels are supplied as standard on 7 m/m Rem. Magnum 30-338 and 300 Win. Mag. at extra charge. Stainless steel is available at extra charge in all calibers.

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ACTION	Bolt, Single Shot & Repeating
CALIBERS—SINGLE SHOT	222 Rem., 222 Rem. Mag., 223 Rem., 22-250, 6 m/m x 47 m/m (6 m/m .222 Mag.), 6 m/m International (6 m/m on .250 Sav. case), 6 m/m Rem. (.244 chamber), 6.5 m/m Rem. Mag., 7 m/m Rem. Mag., 7.62 m/m Nato (308 Win.), 30-06, 30-338, (.30, 7m/m Mag.), 243 Win., 300 Win. Mag.
REPEATING	7.62 m/m Nato (308 Win.), 222 Rem., 222 Rem. Mag., 223, 6 m/m x 47 m/m, 6 m/m Rem., 6 m/m Int., 22-250. Calibers whose over-all loaded length is equal to or shorter than the 308, 243 Win., 6.5 m/m Rem. Mag. (3 shots in magazine only).
CAPACITY	Single loading and 5-shot clip repeater. (Repeater loads with clip from top of receiver in 308 head size cartridge only.)
SIGHTS	Redfield Olympic front & rear sights optional.
SAFETY	Thumb operated safety with standard trigger.
RECEIVER	Drilled and tapped for metallic sights and telescope mount bases. Target type blocks furnished.
BARREL LENGTH	27¼″ free floating.
LENGTH OF PULL	13½″. Trigger adjustable 1 to 3½ lbs. 2-ounce trigger available at $40 extra (no safety).
STOCK	Selected American Walnut Fore-end stop and sling swivel adjustable on base.
OVER-ALL LENGTH	47″
AVERAGE WEIGHT	Without Sights: Heavy Barrel 11¼ lbs. Standard Barrel 9¾ lbs.

CALIBER	TWIST	Max. Avg. Three 5-Shot Groups 100 Yards
222 Remington	14″	.45″
222 Remington Magnum	14″	.45″
223 Remington	14″	.45″
22-250	14″	.55″
6 m/m x 47 m/m (6 m/m 222 Magnum)	12″	.55″
6 m/m International (6 m/m on 250 Sav. case)	12″	.60″
6 m/m Remington (244 chamber)	10″ or 12″	.60″
243 Win.	10″	.70″
6.5 m/m Rem. Mag.	9″	.70″
7 m/m Remington Magnum	9″	.75″
7.62 m/m Nato (308 Win.)	10″	.75″
30-06	10″	1.00″
30-338 (30 7 m/m Mag.)	10″	1.00″
300 Win. Mag.	10″	1.00″

These accuracy specifications are the maximum we accept before shipment. The targets are furnished with the rifle along with the load data.

Remington, DU PONT

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